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ABSTRACT

Computer mediated learning (CML) courses can overcome the temporal and spatial obstacles of isolated commuter students with busy schedules. Whether presented online or as an add-on to an on-campus course, the CML course needs a good syllabus. This paper discusses components of a CML syllabus and online activities for students. Typical components of a regular class syllabus are defined, as well as possible unique or modified components of a CML syllabus. Components include course advertising, "how to use this syllabus," table of contents or course map, contact information, required textbooks and other materials, examinations, grading procedures, provisions for disabled students, activities that encourage students to use technology, student roster, tutorials, and an idea sharing segment (listserv, chat room, bulletin board). Web sites with expanded descriptions and additional syllabus components are listed. The use of hypertext links to other web sites can build the syllabus into an expanded student resource. The syllabus could be linked to information sources, a homework page, home pages of faculty and students, collections of solved problems, references works, class archives, videotaped or animated demonstrations, and a page for student notes on electronic materials or course feedback. When beginning a CML course, first activities include introducing participants, explaining net etiquette, introducing site maps, pairing novices with more experienced learners, and clarifying expectations. Online teaching tips and additional student activities are recommended. Contains web site references. (SV)

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TECHNIQUES FOR DEVELOPING A SYLLABUS/WEBSITE FOR A COMPUTER MEDIATED LEARNING (CML) COURSE

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INTRODUCTION

Many institutions of higher education find the CML courses especially appealing to that growing student body component - the off campus nontraditional student who may work full time and live some distance from campus. CML courses can overcome the temporal and spacial obstacles of isolated commuter students with busy schedules. Advances in computer hardware, software, and Internet access have provided educators with a plethora of computerized resources to augment their regular classes or create courses that are totally computerized.

Whether it is used for an online course or for an added component to an on-campus course, a good course syllabus will well serve both the instructor and students in defining and completing a CML course. A CML syllabus will contain information concerning the materials, directions, practices, and procedures students will need to perform all of the activities required for the course. It provides teachers an opportunity to personalize the course content by stating beliefs about teaching roles, the purpose of education, and the role that students play in learning. The syllabus conveys the teacher's desire to help the students so that the course goals are attainable.

In this paper, a variety of activities are listed which should function as idea stimulators when designing syllabi. We have listed things that the instructor might integrate intothe program as well as student activities.

COMPONENTS OF A COMPUTER MEDIATED LEARNING (CML) SYLLABUS

Generally, a syllabus includes a course and instructor description, why the course should be taken (often a recruiting tool), the components and objectives of the course, the changes which are expected in the student, prerequisites, any assumptions made about the students, and advice for success for all learners. The syllabus relates the course to other courses in the sequence and to the goals of the department and the university and conveys the intellectual challenge of the course (Harris, 1993), and the teacher's enthusiasm for the subject. A CML syllabus should contain all of the required components of the regular syllabus, which may be included in a list distributed annually by the administration. Listed below are the regular components of a typical syllabus and some of the possible components of a CML Syllabus which are either unique to CML or which need to be modified for use in CML.

Course Advertising: When the syllabus functions as a Web page for a course, it should begin with a segment which advertises the course. See for example http://www.nyu.edu/classes/garbage/. This information should be provided at the top of the syllabus so that it will be easily accessible to search engines which may only pick up the first 100-200 characters on a page. To draw students from other locations, include information about how to access the course, its tuition, start date, and other necessary details. The syllabus should contain links to appropriate sites so interested students can find course information. It is necessary to indicate what the minimum hardware requirements for accessing and participating in the online course will be and which, if any, downloadable viewers will be needed on the students' computer.

How to Use This Syllabus: After the advertising, provide directions on how to use the syllabus. See for example http:www.quasar.ualberta.ca/nethowto/. Indicate the most important points and insure that the student is cued to read or experience these points. For example, make it clear to the students what information is contained in each section of the syllabus, the importance of the course schedule page for assignment due dates and the discussion group requirements for participation in class discussion.

Table of Contents: Provide a table of contents if your syllabus has many pages or page groupings (8 or more). For an example of a main index see http://www.cryst.bbk.ac.uk/PPS/index.html. For a large syllabus start with a flow or block diagram of the components. For example see http://128.172.170.24/gj/201/201.html. This will allow the use of the fewest number of levels when you link pages together.

Course Map: The course map is an alternative to a table of contents.Sometimes it may represent a building with a variety of locations, for example see (http://itrc.uwaterloo.ca/~engl210e/). Usually a course map is graphical rather than outlined text which is beneficial for some visually oriented learners. See for example http://www.cl.uh.edu/INST5931/. It may, in fact, be useful to provide both a course map and a table of contents and let the students select which one they want to use. For those who are unsure about this try putting a counter on the table of contents and the site map and see if they both get use.

Contact and Address Information: Students should be able to communicate with the instructor after

*An expanded copy of this paper and its presentation are available at http://home.okstate.edu/conference.

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class. Instructors should provide an email address, phone number, office address, home phone number, home address, home email for them. Other information may include synchronous and/or asynchronous office hours and details, i.e. email only, chat room, phone or in person, or some combination of the above, and how often the instructor will logon. Be explicit here so that the students will know how long they will have to wait before being answered and what the maximum lag time may be. List days (Saturday and/or Sunday) when email will not be checked so they will know when to expect a response.

Text materials: List materials the student is responsible for acquiring; books, readings, supplies, and the like. Provide full bibliographic information with the locations at which they can be acquired. This is particularly important when learners are at a distance. If the teacher holds copyright articles can be directly posted to the Web. For example see the Internet Public Library http://www.ipl.org/. If copyright is not held, password protect the articles and post them to the Web under the educational fair use provision of the copyright law of 1976. In Web assisted and/or enhanced courses, the student needs to know which parts of the course must be accessed using the computer and any alternative ways in which materials can be acquired, e.g., in a text library.

Examinations: If examinations are put on line, there are programs which will randomly present multiple choice items, with a different set for each student, and score the student responses to the items. Other programs will reorder the response choices while leaving the stems the same. See http://www.unc.edu/courses /ssp/tips/testing.html for tips on online testing. If teachers follow control methodology how will they insure security for the item sets? This is a question that should be answered. Some instructors use diagnostic examinations as part of a computer aided assessment process where the computer controls the difficulty level of the assessment using a hierarchical difficult item set to stretch the student cognitively and to assess the point at which the student will fail. The purpose of this kind of assessment is to use the diagnosis testing to route the student around material that the student knows and thereby providing appropriate levels of challenge and difficulty. For sample online questions see http://www.uwsp.edu/ acad/educ/wilson/exams/703exam.htm.

Grading Procedures: The grading procedures should be spelled out following university regulations. The requirements for each grade level (A, B, C) need to be clear and defensible. How are they calculated? What is the policy on "I's" and "W's"? What is the last date at which a progress report is due to the students? (Follow university regulations.) Grading criteria for papers and projects, as well as examinations need to be spelled out. Any additional ways to make or lose points or credit needs to be discussed in writing. Information about the ways that grades have distributed will help students decide iftheclass is right for them. The grade distribution, more than anything else, indicates whether or not mid-range students can be successful. Posting the grade distributions from previous semesters can draw students to your class or it can keep enrollment numbers down, depending on the grading philosophy.

Disabled Students: There is usually a standard paragraph which must be inserted for disabled students that states, "If any member of this class feels that he/she has a disability and needs special accommodations of any nature whatsoever, the instructor will work with you and the Office of Student Disability Services (or other appropriate title) to provide reasonable accommodations to ensure that you have a fair opportunity to perform in this class. Please advise the instructor of such disability and the desired accommodations at some point before, during, or immediately after the first scheduled class period." Are there other provisions which will be provide for disabled students such as, low vision readers, text for audio, and so forth? These additional provisions should also be specified in the syllabus.

Encouraging Students to Use Technology: If the course is not fully Web based the instructor will want to get the students involved with the technology. There are a variety of activities that can be built into the syllabus which will encourage students to use technology. See for example http://sunsite.unc.edu/horizon/mono/ CD/Instructional_Technology/MacDonald.html. Methods include requiring the students to use email to submit papers and projects; using email to answer student questions, making comments on assignments made in email on email; requiring students to get their assignments on line; requiring students to find information on the internet; require students to post articles electronically; require presentations which use technology require student Web pages, and require the use of graphs and spreadsheets which are computer generated. Many exploration and uses activities are provided at http://www.unc.edu/courses/ssp/tips/introducing.html.

Chat Room: A chat room is a cyberspace location where people can present messages and receive responses. Chat rooms are synchronous vehicles which require that participants be on line at the same time. If students are to have real-time dialogue, or if the instructor wants to talk with students in real time, link the syllabus or home page to a chat function. A chat room will need to be set up by the instructor in advance, and students will

need to be instructed concerning chat etiquette.

Email: Many will want to make the assumption that all students know how to communicate using email. In ten years this may be a valid assumption, but it is not today. The teacher should provide a link to the email system which students should use and a manual so that they can get up and running. The reason that the teacher should provide the email, or at least specify which system to use, relates to the way in which the various systems transfer files. If the systems are just slightly incompatible, and this is likely, then it may not be possible to transfer files or messages between learners.

Procedures for Use: In relation to collaboration or to computer usage, the teacher may want students to logon and get their assignments on time, you may also want them to submit their answers to the assignments electronically using forms or email. To encourage this, teachers may want to post a message a day so that students will check in to read the message and will be online so that they will, in all probability, also read other questions and responses collaboratively.

Student Roster and Communication: To enhance student communication among each other, provide a student roster with students' email addresses and other contact information the students themselves provide. From this list the teacher can produce a listserv for sending broadcast messages to the whole class when appropriate. For collaborative courses, the student address list is essential for students to share their work, comments, questions, and so forth with others. Most collaborative projects will require whole class or team interaction as well as one-on-one interaction. Listservs and email for private messages can accomplish this very well. Teachers may also wish to have a chat room or other synchronous interaction space to allow students to interact in real time.

Tutorials: Tutorials are usually scheduled by the instructor. Here the instructor will work with one or more (usually several) students in a synchronous mode to present information, ask questions, and provide answers to student questions. The general purpose is to insure that all of the students have been exposed to particular content that the instructor thinks is important. Tutorials may be programs which teach or practice the student in working with or using a specific concept or process. There are many tutorials on the Web for many areas. For example physics (semiconductor manufacturing at http://www.fullman.com/semiconductors/), mathematics (graph theory at http://www.utm.edu:80/departments/math/graph/), and biological science (The Interactive Frog at http://curry.edschool.Virginia.EDU/go/frog/ or The Virtual Fly Lab at http://vflylab.calstatela.edu/edesktop/VirtApps/VflyLab/IntroVflyLab.html).

Idea Sharing: An idea sharing segment of a syllabus may be a listserv, chat room, bulletin board, virtual reality, or other cyberspace where information can be posted or where individuals can interact. Idea sharing can be done by the instructor, by individual students, or by all of the students at different times. Ideas are presented which relate to the material that the students are studying or exploring, or ideas for new explorations can be presented. Students can publish original documents for peer critique, comment, or edification. Information related to projects can be shared or disseminated depending on the source. (See list of listservs at http:www.lsoft.com/lists/listref.html

More Syllabus Components: An expanded description of more syllabus components is available at (http://home.okstate.edu/conference) under the following headings: expectations (instructor), exams and major assignments (see web exploration assignment http://www.msu.edu/user/coddejos/horizon/mono/higher_ed/edited/codde.html), list of key concepts (see Netspeak at http://sunsite.unc. edu/horizon/mono/CD/Internet_Glossaries/lingo.html or a hyperglossary at http://www.cryst.bbk.ac.uk/PPS2/ glossary/index.html), model papers/project (see the Germ at http://jefferson.village.virginia.edu/courses/ennc986/germ.html), course objectives and outline, your name, office hours and bio, research teams, solicit subjects, collect data, requests for participation in research teams, research publications, portfolios, help desk, lab safety/health policy, policy on attendance, fees in addition to tuition, other requirements (see http://www.tgsa. com/require.html for hardware and soft ware requirements), statement to cover possible changes in the syllabus, statement of academic integrity, due dates, university policies, course cafe, style/mode of teaching, prequisite and support courses, add/drop policy, and course number and title.

SYLLABUS LINKS

Hypertext links provide access to other Web sites. The use of links builds the syllabus into a resource which students will use throughout the course and beyond. The following variety of topics to which a syllabus could be linked is not an exhaustive list. Others may relate specifically to the discipline. Motives for creating links include facilitating browsing or navigation, providing access to issues, papers, tutorials, and other activities. Links may provide support for a particular viewpoint, validate opinions and feelings, and entertain by leading the students to curiosity-provoking information or to fun activities. Links may also be used to respond to an issue, pose a

question to an issue, provide support in both the cognitive and affective domains, start a controversy, develop generalizations or discriminations, show objects, and refer to similar opinions. Remember to provide the URLs in the links section so that students can copy them for use after the syllabus is no longer available.

Web Resources: There are a great many resource Web sites (see examples http://www.unc.edu/courses/jomc050/useful.htm or http://www.oclc.org/oclc/menu/home1.html). A Web resources page allows the instructor and/or students to post resources which may be scanned before posting. Web materials are not reviewed and students therefore must learn how to self-evaluate any materials that they download. The teacher might want to share these questions (and others appropriate for your discipline) with students: Can you identify the author? Is the author affiliated with an institution of higher education? Has the author published other information on similar topics in refereed journals? Is the material in an on line journal? Does the on line journal have an editorial board that reviews articles before publication? Material from the Web is likely to seem the most relevant, most immediate, most accessible to students, and the most up to date. The importance and relevance of Web resources varies widely with students and disciplines (for resources in higher education see http://contract.kent.edu/change/articles/ julaug95.html). To use time and Web resources wisely, a descriptive or rating system can be developed and used to rank resources.

Homework: Posting homework problems forces students to get on the computer. Also, the teacher can post answers to the homework after the due date has past for students to check their answers. Electronic homework submission allows students immediate access the correct answers and immediate feedback. Homework help is also available (see http://www.unc.edu/courses/jomc050/homework.html).

Home Page Links: Home page links might include the instructor's homepage, the departmental homepage, the college homepage, and the university homepage (see for example http://www.cee.umn.edu/dis/courses/MICE5309_5000_01.www/). Links to the library catalogue allow students to go directly from the syllabus to the library for needed references and/or materials. Links to class members' homepages allows students information about the interests and background of their classmates. Student home pages are particularly important in setting up collaborative team projects. Students feel more comfortable when they know something about the people with whom they are working.

Collections of Solved Problems: If students are asked to solve problems teachers should provide them with solved problems with the work shown. In mathematics and in other problem based disciplines providing copies of solved problems is effective in improving student learning.

Tying Links to Text: If you provide text for students to read on the Web, you may want to embed some links in the text. See for example http://www.stg.brown.edu/projects/hypertext/landow/victorian/victov.html. Text links can provide a glossary of new vocabulary words and enrichment material for in depth investigations (see for example http://www.icbl.hw.ac.uk/ctl/mayes/paper1.html).

Hypertext Possibilities: A hypertext environment facilitates student learning. See for example http://projects.iat.unc.edu/blake/. A definitions link provides a glossary or a dictionary for new terms. Students are more likely to use a link for an unknown term rather than to seek meaning in context or look it up. A graphic link enhances the student's understanding by providing a visual image e.g., a microscope slide of a _____(you fill in the blank). The instructor may wish to show drawings, photos, pictures, paintings, or graphs. Other graphic links include animations which show processes, morphs (pictures that are animated to change, e.g., as a person ages over time), movies or audio examples which are only meaningful if seen or heard, and Web sites which have in depth information for projects or reports. Finally, we may want to link to maps can be used to display a wide variety of relational information. Client side maps are created by individuals, not controlled through a server. Server side maps are located on a server and are remotely accessed. You may also provide image maps with clickable hot spots (where you can click on the map to get more detail or information). Optional filters on maps decrease the amount of information and fish eyes allow learners to zoom in. All of these features may be useful in certain disciplines.

Archives: Archives are developed to share student work, to improve teaching and to provide a resource for future classes. Some archives include, for education http://www.coe.uh.edu/archive/beginning.html, for history http://www.lib.byu.edu/~rdh/eurodocs/, for Greek mythology http://home5.swipnet.se/~w-58907/GGGM-F/GGGM-central.html, and poetry http://sunsite.unc.edu/ipa/. Some instructors have their students post papers and projects to a class Web site so that they can be examined and shared with other members of the class. This lets the students see what the competition is doing and allows them to compare their products to the products of others. This, in turn, increases the general level of student products. In some classes, students are asked to develop a method of teaching any material that they mastered, but which they found difficult. These teaching materials are used for students who are slower or for future classes to help them go faster and farther in the material. Finally, archives can be used as a

resource for future classes. Students can link to older papers and summarize them and build upon them to integrate new information. This is particularly useful in areas where the discipline is developing rapidly.

Demonstrations: In many courses there are demonstrations which are presented to the students. These can be in psychology (see Pavlovian conditioning at http://www.users.csbsju.edu/~tcreed/wcb/pavdemo.html), physics, biology, zoology and in many other areas. Teachers may wish to create demonstrations using animations, video, or they may be found already created on the Internet. Teachers can then provide links to the demonstrations either within the syllabus or to external resources.

How to Take Notes on Electronic Materials: Teachers should ask students to make a record of any questions that the material raises in their minds. Have these questions posted to a questions page which other students can answer for points. If any question is unanswered for more than two days the teacher should answer it. Teachers will find that peers will answer most of the questions. Students should provide personal examples of concepts which can be shared with other students. Student generated examples are more likely to be on the level of the students and therefore more appropriate than instructor generated examples. Teach students to bookmark important ideas to come back to later. This requires annotation of bookmarks, which can be done by pasting the URL into a word processor, using control c (to copy) and control v (to paste), and then typing in the annotation. Students should also keep a list of things to think about or review as they peruse electronic material.

Feedback Database: Some instructors want to collect frequent feedback from their students, especially when they are trying new procedures and material. An instructor can set up a feedback database where students can respond regularly to questions about the course content, projects, using the electronic medium, etc. Teachers may provide some small incentive to the students for providing feedback, such as bonus points. If the course is totally on line the teacher will want to insure that the students have an opportunity to evaluate it using the standard university form. Also, teachers will probably want to gather other evaluation information related to learning in an electronic format. A link to the syllabus and a date in the TO DO section of the time line will assist the students in remembering to fill out the evaluation form. If confidentially is needed the instructor can have the evaluations sent electronically to another office until grades have been posted. Explain thoroughly so the students will be honest in their evaluations.

Discipline Pages: A link to pages which define and exemplify the discipline is very useful. See geology example at (http://www.enmu.edu/~piercer/geol/welcome.htm).

More Syllabus Links: More syllabus link ideas are available at (http://home.okstate.edu/conference) under the following headings: Class notes, incomplete note forms, hypertext description, databases (see astronomy digital image library at http://wwwascusc.org/jcmc.vol2/issue3/), subject guide (http://www.cde.psu.edu/DE/IL/ART_122W/StudyGuidepreview.html or for Shakespeare http://shell.idt.net/~kcn/shakes~1.htm), self-assessment items (http://www.academyonline.com/academy /athens/latin/latin1.htm), diagrams, enrichment materials (humanities at http://www.dipoli.hut.fi/org/TechNet/ org/humanities/envi/index.html or at http:/ucmp.berkeley.edu/), writing assistance (http://www.wsu.edu:8080/ ~brians/errors/index.html), downloadable programs (http://campus .esri.com/campus/home/home.cfm). technical notes, computing resources, statistical resources, class news group (http://www.vianet.net.au/~timn/thesis /appd.html), student support services available (for careers see http://www. unc.edu/courses/jomc050/career.html), instructor's announcement page (What's New Page), frequently asked questions (FAQs), teaching, and tutors.

SYLLABUS DESIGN

Design Principles: Beginning a Course

First Activities: The first thing a teacher should do when beginning a CML course is to send the students a welcome message and congratulate them for getting on line and finding the Web site or Web syllabus. The second thing is to provide a collaborative activity where they can get their feet wet. The first distance assignment should draw on the student's own experiences and should not be technologically demanding. Such as a single task minisession which can be accomplished the first time they are on line. Usually this takes the form of filling out a questionnaire about themselves or constructing an autobiography that can be shared with other collaborators. This invites student responses, shares email addresses, encourages interaction and, if the teacher solicits it, can begin the development of comraderee. If students have homepages, request that they invite their classmates to visit them.

Net Etiquette: A brief session on net etiquette provides rules to play by (see http://www.cl.uh.edu/ INST5931/Lesson4/less4.html). In a synchronous environment, the group can brainstorm to set rules they can all agree to. One rule is related to brevity- it is usually better to be brief than to be verbose. This is even more important in a CML environment than it is in a traditional classroom setting. Another is to summarize what is being responded to if a comment is being entered into a thread that has been going on for a while and where responses

may not necessarily be in a strict logical sequence. Students may take a netiquette quiz at http://www.albion.com/netiquette/netiquiz.html.

Introducing Site Maps: If teachers are providing text in a hypertext environment they should provide suggestions as to where the learners should begin if there are many entry points (see http://edweb.sdsu.edu/webquest/Process/WebQuestDesignProcess.html). Also, provide alternative routes if the text is long and contains many links. Typically, it is helpful to provide an orientation strategy which will show the structure of the content and will assist the students in navigating it (see http://www.mandozine.com/map.html or http://www.well.com/user/polly/sitemap.htm). Teachers may want to show how various tracks through the content can be constructed to satisfy a variety of student generated objectives. If alternative tracks are provided these should be mapped and explicated.

Buddy Programs: A teacher starting a unit with new learners the teacher may want to pair up those who have some experience with the novice learners. The more experienced learner can help the novice trouble shoot problems, usually with the equipment or programs. This is a mentor/buddy program. A straight buddy program pairs together those who have no experience. With a mentor/buddy program they are encouraged to work side by side to learn. This way they quickly see that both have problems but that problems can be overcome.

Clarifying Expectations: Teachers should make participation expectations clear and model responsiveness. The expectations can be set either by the teacher or during a brainstorming session where the students talk about what must be done to set up an environment in which all can be optimally productive. In the electronic environment the teacher must specify the number of logons, and the number of posts that you expect from the students for a grade of "X".

Additional Syllabus Design Components: Additional syllabus design components under these headings are described at http://home.okstate.edu/conference: community building(learning communities on line at http://prism.prs.k12.nj.us/cgi-bin/hn-Oll/get/forms/Oll/1/3.html), and sharing student created materials.

ADDITIONAL SYLLABUS ACTIVITIES

In this section we will look at some of the things teachers may want students to do as part of their learning experiences as well as things that you as the instructor could do to support student learning (for example check up on the flu season at http://www.cdc.gov/). This listing is by no means exhaustive, but it is illustrative of what those in the field of CML are doing at the present time.

Student Activities

Keep Student Activity Records: An activities log can be used for a grade, part of a portfolio, or a reflective learning project. An activities log details what they did on line and where they explored. In some classes, students are asked to explore the Internet and look for particular kinds of information. Here an activities log may be a copy of the places that the student visited, as evidenced by his/her bookmarks. To facilitate this, teach students how to post information to threaded conferences.

Join an Internet List: There are a great number of discussion lists related to many disciplines. If yours is the first Web based course that students take, the teacher should familiarize them with many of the possible activities which can be conducted on the Web (see directions for Usenet at http://www.cs.indiana.edu/docproject/zen/zen-1.0_6.html#SEC31). This includes being on a list. It is generally good to teach them a little about the culture of lists before turning them loose. It is better to lurk on line and observe before posting so that posting is not done inappropriately.

Participate in a Chat Room: A teacher may develop a chat room for the class so that members can interact synchronously (see tips at http://www.siec.k12.in.us/~west/edu/chat.htm). There may also be chat rooms that individuals may wish to join, based on their interests within the discipline, which are available on the Internet (see http://www.jasonproject.org/front.html).

Virtual Environments, Participate in: In some disciplines there are ready made virtual environments to which students can link. These include a tour of diversity university MOO at http://www.december.com/john/teach/cmc/rpi94/mootour.txt and active worlds at http://www.activeworlds.com/. For directions for use see http://tecfa.unige.ch/edu-comp/WWW-VI/eduVR-page.html.

Conduct Web Searches: Teachers may want to have the students search the Internet and find information services or products which they would want them to examine (to find out how see http://www.unc.edu/courses/jomc050/search.html). There are many articles on the Internet which are peer reviewed and are prepublication copies of journal articles. There are papers from the proceedings of many conferences (sometimes before the conference takes place), and there are electronic journals in many fields. Teachers will want to teach students how to evaluate information found on the Internet is the author listed? What are the authors credentials? Will the author

be held accountable for the information which he has posted to the Web? Is there a bias (political, commercial, religious, other)? Who is the information designed for? How current is the information, assuming it is dated? Undated information is probably not worth having in most cases. Are there references, or links to other sites which support the information presented?

Develop a Web Page: Web pages can be used to post class projects to an authentic audience, to introduce students to one another, list research interests of students hoping to participate in research teams, list student experience which others might look for it they were searching for diversity, etc. There are a variety of free and inexpensive programs which can be used to assist students in Web page development, or the institution may have such programs on its LAN (check with your computer center). Class Web pages can be used to introduce others to the things that are learned in a class. From this standpoint they can be used as recruiting tools. Teachers can have the students work together to set up a class tour of the content. Students can create materials which will help other students learn the content better and provide organizers which will help future learners better understand the content. Group products can be posted to a class Web page to show what the class has done and the class can list questions which still need answers. These questions can potentially guide the study of subsequent classes.

Work Through Simulations: In a number of areas in both the hard and soft sciences there are simulations which can be viewed, interacted with or participated in. See for example http://www/ascusc.org/jcmc/vol2/issue/. Teachers can provide these simulations for students by linking them to the syllabus. See for example http://medicus.marshall.edu/medicus.htm.

Instructor Activities

Promote Many-To-Many Learning Activities: Paulsen (1995) presents the concept of many-to-many learning where groups of learners work together. Teachers may want to initiate any of the following processes if you are trying to set up these collaborative processes: debates, games, role playing, case studies, discussion groups, brainstorming groups, delphi groups, nominal groups (for use in nominal group techniques), forums, focus groups, and simulations which are used to compress time or when situations are dangerous (http://www.hs.nki.no/~morten/cmcped.htm).

Develop Web Quests: Web quests are designed to help learners become familiar with the Internet and to help them find information that will be useful for projects (see description at http://www.cs.colorado.edu/~corrina /WebQuest/. Web quests start with the development of background information which establishes the need for the quest. A task is created which is doable, interesting, and specified in terms that are appropriate for the level of sophistication of the student(s). The search is begun by recording the information found and the anchors and links to other information that is related to the things found. The process should be clearly described, and the teacher should provide guidance in terms of directions and questions which focuses student activity. Time lines and concept maps may be developed, and there should be a conclusion to the task. Such as a report, paper, or other product which summarizes the information found. See WebQuests at http://www.firstmonday.dk/issues/issue5/perrone/index.html.

Develop Comfortable Learning Communities: Learning communities must be comfortable for learners. Develop psychologically secure environments (PSE's) which are collaborative environments which provide a secure family-supportive relationship structure. These environments will promote trust, make interaction more thoughtful , provide safety and support, and contain no inherent aversives for students. According to Papert (1993), the Web matches the ways in which students like to learn, and this makes comfortable learning communities possible. Groups which work together collaboratively develop a discourse history or collective intelligence to which all have input. As people interact in this kind of an environment, the group intelligence increases. To have a comfortable community learning environment you should be kind and gentle on the Web. Anything else reduces participation and, thereby, group intelligence about the project/concept/task under discussion.

Promote Reflection: Reflection is a process of thinking about one's thinking. Many students have never had this explained to them nor have they developed the idea on their own. But, to understand what went right or what went wrong and why, the student must think about it. Students should be taught to look at the ways in which they were thinking when they did things. This may start with think alouds where they (in a CML environment) write down what they were thinking about as they go through a process, like solving a problem. This think aloud should be detailed enough so that if there is a problem they can track all of the steps that they thought about and did as part of the process. In more complex settings they should try to think back on the critical incidents or the triggers that provided indicators that things were or were not working (see ThinkQuest as an example at http://library.advanced.org/11402). Peer interaction is helpful here. If several learners have had the same experience they can all provide what they think the critical points are and discuss the discrepancies. This will point

out to the students who are not reflecting well or analyzing well what others look for that leads to success.

Develop time lines: Many students need time lines. Students procrastinate, and, if this happens in a CML environment, peers will be left without support. The instructor should teach students how to look at a project, learning experience, or report, and estimate how long it will take for each player to create and share his or her parts of the material. This estimate should take into account the regularity with which all of the collaborators can get on line and is dependent on when the critical building blocks are presented. The latter is the basis for PERT charting: who is going to do something that another person is dependent upon and when does it have to be done? Teachers should expect to have several brainstorming sessions on line with each group before they can do efficient time lines. It should be emphasized that collaborative CML projects almost always take longer than students estimate because of unforeseen delays on critical pieces of the project. In large projects teach them about "tickler" messages to remind others of approaching deadlines. Teachers should also inform the students that a lack of planning on the student's part does not constitute an emergency on the teacher's part.

Promote Annotations Teach students to annotate text material (see description at http://elmo.scu.edu.au/sponsored/ausweb/ausweb96/educn/rutherford/paper.html). In an electronic environment this can be done with hypertext links. Students can compile potential questions that might be asked on a test, or the answers to formative questions which have been embedded by the teacher. Students who go through the material later or more slowly have the advantage of reading the answers to previously asked questions. Advanced students or those who move quickly through the material should be taught to develop FAQ's for their classmates. This will help them and will keep the same question from being asked again and again. The FAQ's can be linked to the various question points in the text.

Study Guides: If questions are provided to guide study, the answers can be linked to them if they are text based. This will provide a study guide for all collaborators and will form the basis for scaffolding for students who do not understand the answers. Concomitant to this, teach the students that it is to their advantage to ask questions of their peers and of the teacher when they disagree or do not understand.

Teacher Annotations: Teachers also can provide annotations. A teacher may want to create an assignment tips section. If teachers have assignments, it is likely that students will have questions about them. As questions are received and answered share the questions and answers with all of the students though the use of an assignment tips section. This can be linked to the assignment or it can be a stand alone which the students are trained to look for in the syllabus or on your class Web site.

Develop Class Reference Collection: Teachers may want to create a class reference collection (see http:/www.inform.umd.edu/EdRes/Colleges/HONR/HONR218C/) or use an existing collection (see http://www.pantheon.org/mythica/). The class reference collection allows teachers or students to place their best work on line. This showcases good student projects. It can be used as a recruiting tool for students in future semesters where they can see the kinds of projects that are required by a particular class.

Other Additional Syllabus Activities: Other additional syllabus activities are listed at http://home.okstate.edu/conference under these headings: post text material, create job aids (see http://edweb.sdsu.edu/edweb_folder/EET/JobAids/sect1/whatrjobaids.html), keep an electronic journal, develop interpersonal exchanges, participate in a class Web conference, develop a book mark list, publish a Web site to teach others, develop (or explore, if one already exists)a current events page (see for example http://washington post.com/), appoint a group leader, thread boss, or mediator, encourage collaborative participation, establish learning circles, create special interest groups, develop problem solving projects, and assist in defining the problem.

SUMMARY

The CML syllabus as we have presented it contains, or can contain, all of the material necessary for a course of instruction. As the instructor you need only add students and your supervision/interaction. A teacher should not feel that all components which we have presented must be used in any one syllabus, but teachers will want to use some of them. The number of the CML components which are adopted will be dependent on how much interaction is desired with the students in a non-CML mode and how much control the teacher wishes to personally have over what the students do. If instructional materials and activities are built, the teacher will need to do little other than monitor student progress. Here most of the work will be on the front end when carefull design of materials are used to develop student behaviors or to elicit the processes which the students need to experience. If content is presented in an adjunct mode such as audio or video streaming, the teacher will be much more involved in the real time process and you will spend less time in the creation process at the beginning.

For the first semester or two teachers will want to work closely with the students because there are always bugs that need to be worked out. When the process is running smoothly the teacher can focus more exclusively on the development of the students knowing and skills.